CONFIDENTIAL

SPECIFICATION NO. 56-A-1051-A
Section A

GENERAL DEVELOPMENT SPECIFICATIONS

FOR

MODULAR SUB-ASSEMBLIES

27 November 1956

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1. GENERAL

1.1. Design Goal

The modules described by this specification shall contain the various stages required to make up a number of radio receivers and transmitters. The receivers and transmitters so formed will differ from each other in frequency range, power output, power input, type of emission, type of modulation, type of tuning, and form factor. However, a single module will often be used in many configurations of transmitters or receivers. For example, in a CW transmitter the keying module could be removed and a voice modulation module added to form a voice modulated transmitter. Versatility of the modules is an important design goal.

The modules will be assembled under two different circumstances. In one case, the inter-module wiring and physical connection will be performed in a laboratory by trained engineers. In the other case, the modules must plug together making both electrical and physical connections and resulting in a trouble-free device. An acceptable (but not specified) method of providing for these two circumstances would be as follows: Supply the basic module, suitably enclosed with solder-type terminals brought out. Supply a hollow box with inter-box electrical connectors and straight-through wiring (such as ground and B+) built in. The basic module which satisfies the first case could then be placed inside the hollow box and wired to connectors to satisfy the second case.

1.2. Purpose of This Specification

This specification shall stipulate the performance requirements of the complete transmitters and receivers and shall present the electrical and mechanical design characteristics that shall guide the development and production of prototype models of such equipment. This section of the specification stipulates the requirements common to all modules and succeeding sections shall stipulate the performance requirements of the specific modules.

2. QUALITY OF DESIGN AND FABRICATION

The electrical and mechanical design of this equipment shall be directed towards the development of a quality product, reflecting the highest possible degree of equipment reliability when exposed to the normally rough handling encountered in field usage.

2.1. JAN Specifications

The contractor shall utilize components, materials, and fabrication procedures meeting JAN Specifications of the issue in effect on the date of the initiation of the contract, unless the use of such components, materials, and fabrication procedures would materially hinder the achievement of the design goals. In such case, the contractor may substitute other components, materials, and procedures so long as they are of the highest quality available and after approval of such substitution by the contracting officer.

2.2. Non-Fungus Nutrient Materials

All materials which are used in this equipment are to be non-nutrient to fungi. If it is determined that there is no suitable non-nutrient material available, the contractor may obtain a specific waiver of this requirement from the contracting officer. Any nutrient material shall be treated with a suitable fungi-resistant compound after machining or other work and prior to installation.

2.3. Temperature Extremes

2.3.1. Operating Temperature

All equipments, except batteries, shall function properly when exposed to operating temperatures of from plus 50 deg. C. to minus 40 deg. C.

2.3.2. Storage Temperature

The equipment, except batteries, shall be capable of being stored in temperatures within the range of plus 60 deg. C. to minus 60 deg. C. without injurious effects.

2.4. Vacuum Tubes and Transistors

In general, the design of this equipment shall be such as to insure that vacuum tube and transistor operation shall be within the manufacturer's recommended limits. However, should it become desirable to incorporate tubes or transistors that shall function outside such limits, it shall be contingent upon the contractor to prove by adequate tests that operation outside such limits shall not introduce unreliability or instability. Vacuum tube and transistor replacement for this equipment shall not require individual tube or transistor selection.

2.5. Miniaturization

Miniaturization is an important design goal, and each module shall be as highly miniaturized as the state of the art allows. Transistors shall be used wherever possible.

3. MODULARIZATION

3.1. Component Division

The division of components among the various modules shall be made by the contractor on the basis of: a maximum flexibility of module; a minimum number of modules to form a complete device; and, where possible, an approximately equal volume between modules. The circuitry of the complete transmitters and receivers shall be such that in the plug-together packaging, the device shall be simple to assemble and to operate.

3.2. Module Form Factor

Modules of a volume over one cubic inch shall, if practical, be supplied in three shapes; flat and thin, cubical, and cylindrical. In the cylindrical configuration, the two smallest dimensions of the largest component in the complete transmitter or receiver shall determine the diameter of the cylinder, and the other modules shall maintain that same diameter. In the flat and thin configuration, the largest components in the module shall determine the thickness and width of the module, except that no module shall be thinner than 5/8". The modules of the cubical configuration shall be as nearly cubical as the arrangement of the components permits. In the flat and thin configuration, and the cubical configuration, there will be no necessary relation between any dimensions of the various modules making up a complete device. Modules of a volume less than one cubic inch shall be as nearly cubical as the arrangement of the components permits.

3.3. Packaging of the Basic Module

Each basic module shall be encapsulated or enclosed in some manner. A provision shall be made for mounting which will require a minimum of space in the module and provide a maximum flexibility of module position with respect to a base plate. Terminals for inter-modular wiring shall be brought out of the module enclosure.

3.4. Packaging of the "Plug-Together" Module

The basic module shall be adaptable for plug-together assembly (as explained in Paragraph 1.1.) by a modification external to the basic module. When packaged for plug-together assembly, the modules shall be capable of being assembled on a flat surface with each module plugging into the adjacent module without inter-connecting cables. A safeguard to prevent incorrect assembly shall be provided.

All knobs, switches, plugs, etc., shall be flush with the surface of the plug-together module, and there shall be no external projections. A minimum number of depressions in the plug-together module as required for female connectors or for slots in knobs to provide for turning the knob, etc., shall be allowed. Those modules which are supplied in three shapes as specified in Paragraph 3.2. shall have the plug-together packaging provided only in the cubical shape.